$$\lim_{x\to 9} \frac{x-9}{\sqrt{x}-3} = \frac{0}{0} \quad \cancel{DNE}$$

29) 6

80%

T1

Q1

Q2

T2

20% H

10 - 3 10 - 2 -

10 3 - 3 - 2 -

3 - 3 -

3 - 3 - 10

3 - 3 - 10

3 - 2 - 1

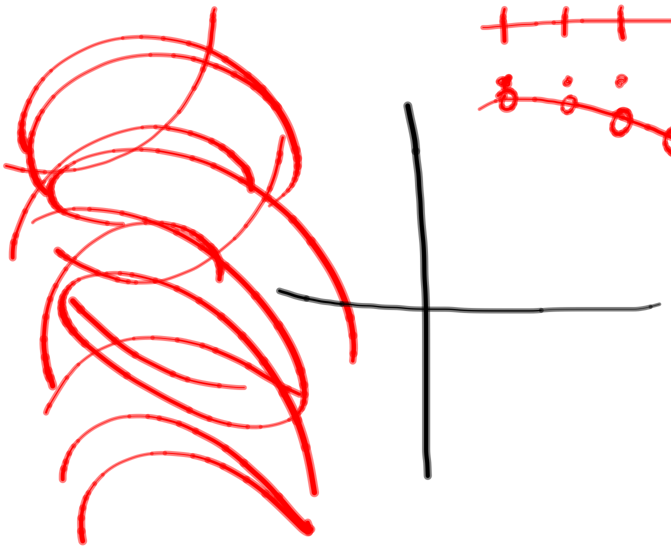
2.1

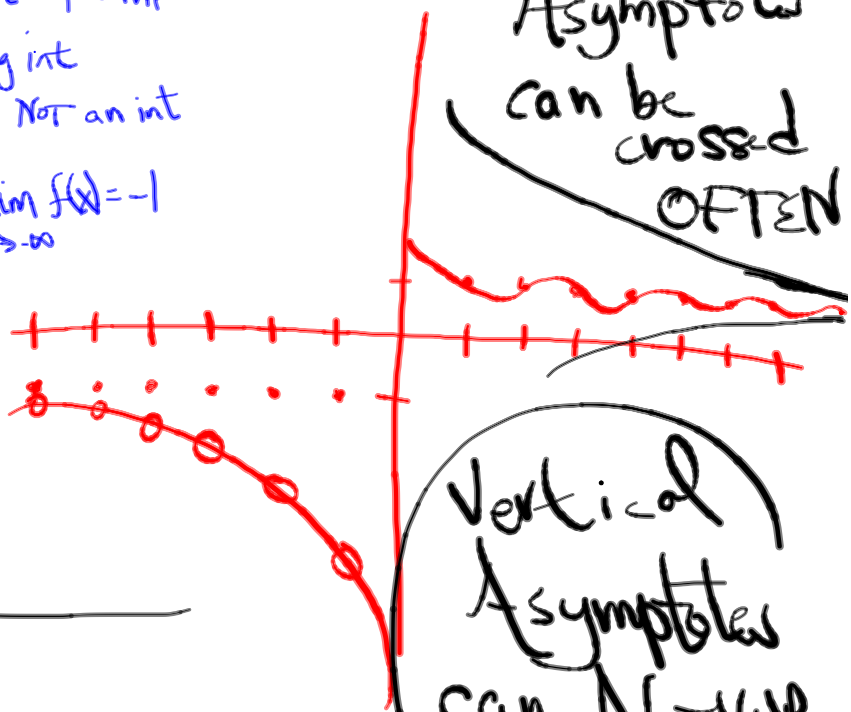
18) i) $f(x) = \begin{cases} 1 & x \text{ is a pos integer} \\ \neq 1 & x > 0 \text{ not a pos int} \end{cases}$

ii) $f(x) = \begin{cases} -1 & x \text{ neg int} \\ \neq -1 & x < 0 \text{ NOT an int} \end{cases}$

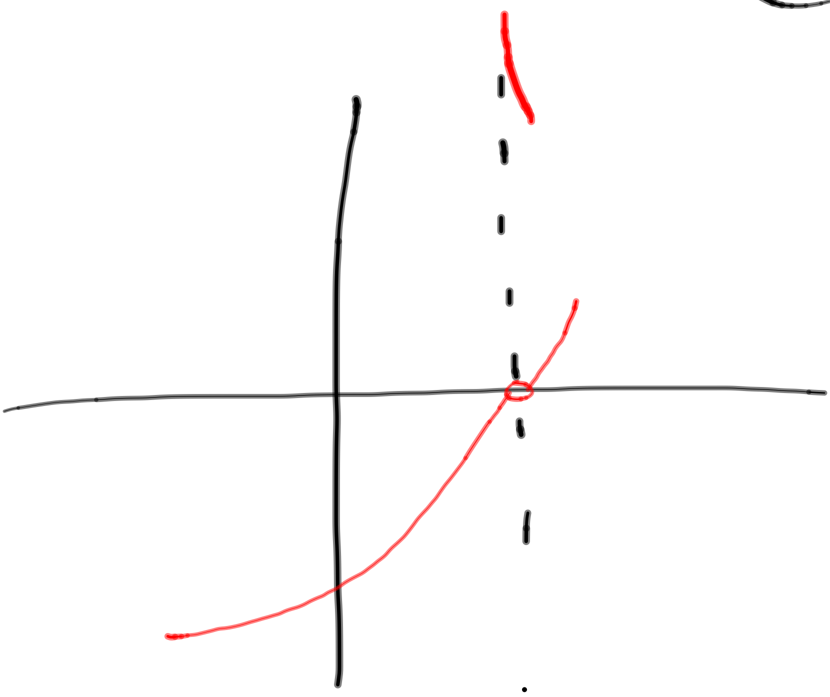
iii) $\lim_{x \to \infty} f(x) = 1$ and $\lim_{x \to -\infty} f(x) = -1$

Horizontal Asymptotes can be crossed OFTEN





Vertical Asymptotes can NEVER be crossed



31) $\lim_{t\to 0} f\left(\frac{1}{t}\right) = L$

$\lim_{t\to 0^+} f\left(\frac{1}{t}\right) = L$

$\lim_{t\to 0^-} f\left(\frac{1}{t}\right) = L$

$\lim_{x\to +\infty} f(x) = ?\ L$

THOUGHT PROCESS

$\frac{1}{t}$ "=" X

~~$\frac{14}{0} = -\infty$~~

~~$\frac{1}{0} = +\infty$~~

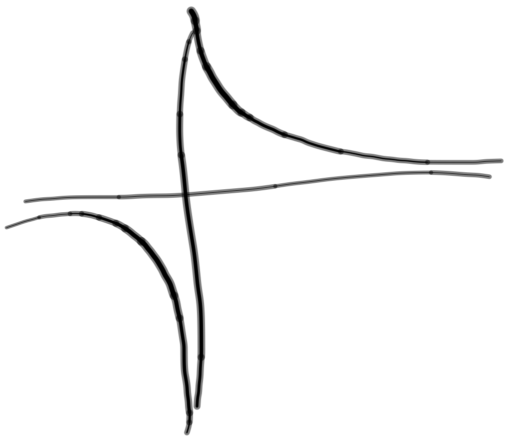
~~$\frac{2}{0}$ DNE~~

AND $t \to 0$ then where is X going?

$\lim_{t\to 0} \frac{1}{t}$

$\lim_{t\to 0^+} \frac{1}{t} = +\infty$

$\lim_{t\to 0^-} \frac{1}{t} = -\infty$



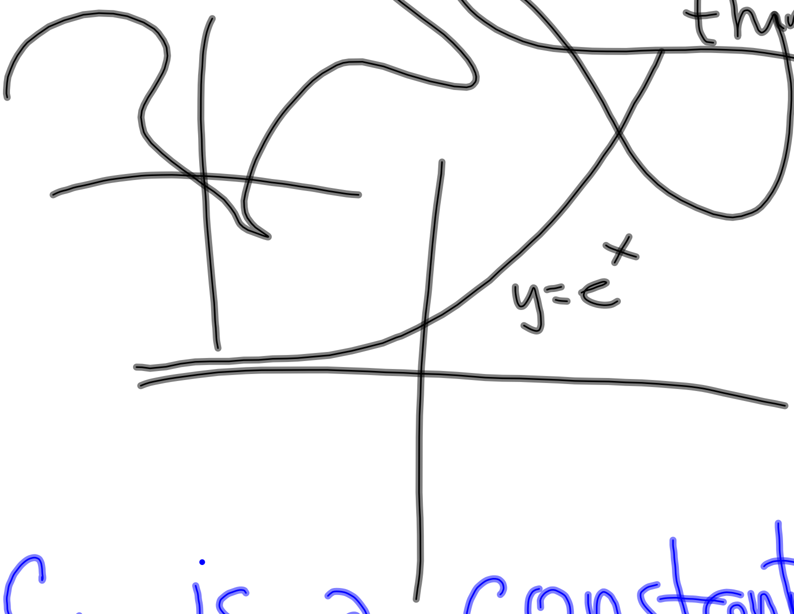
Deal with:

X is a <u>variable</u>

"number you don't know"

Algebra 2: Know which #

Precalculus: FUNCTION thinking



C is a <u>constant</u>

L is a <u>number</u> (that you don't know)

point of 34

calculators keep 12 (or 13?) digits accurately

$\sin(e^x)$

2.2

30) $\lim_{x\to 4} \dfrac{4-x}{2-\sqrt{x}}$ "$\frac{0}{0}$"

If there is a radical in the problem, One of the things you can try is multiplying by The conjugate

CONJUGATE

jugger

$$\lim_{x\to 4} \frac{4-x}{2-\sqrt{x}} \cdot \frac{2+\sqrt{x}}{2+\sqrt{x}}$$

$(a-b)$

conjugate: $(a+b)$

a^2-b^2

$$= \lim_{x\to 4} \frac{(4-x)(2+\sqrt{x})}{(4-x)}$$

$$= \lim_{x\to 4} \frac{2+\sqrt{x}}{1} = 2+2 = 4$$

$$4-x = (2-\sqrt{x})(2+\sqrt{x})$$

2.2 39)

$$\lim_{x\to 0} \frac{\sqrt{x+4}-2}{x} \cdot \frac{\sqrt{x+4}+2}{\sqrt{x+4}+2}$$

$$= \lim_{x\to 0} \frac{(x+4)-4}{x(\sqrt{x+4}+2)} \qquad x+(4-4) = x$$

$$= \lim_{x\to 0} \frac{x}{x(\sqrt{x+4}+2)} \qquad \cancel{\sqrt{x+4}+2}$$

$$= \lim_{x\to 0} \frac{1}{\sqrt{x+4}+2} = \frac{1}{4}$$

2.5)

CONTINUOUS FNs

- never ends
- function
- WAG - something to do w/infinity
- unbroken Curve

www.calculus-help.com

PATHOLOGICAL function

- draw without lifting pencil

wolframalpha.com

$$\lim_{x\to 9}\frac{x-9}{\sqrt{x}-3} \qquad \boxed{6}$$

29) $6 \qquad \lim_{x\to 9} 6 = 6$

If

2.3

20) $\lim_{x \to +\infty} \frac{\sqrt{5x^2-2}}{x+3}$

$= \lim_{x \to +\infty} \frac{\sqrt{x^2}\sqrt{5-\frac{2}{x^2}}}{x(1+\frac{3}{x})}$ b/c positive

$= \lim_{x \to \infty} \frac{x\sqrt{5-\frac{2}{x^2}}}{x(1+\frac{3}{x})}$

$= \lim_{x \to \infty} \frac{\sqrt{5-\frac{2}{x^2}}}{1+\frac{3}{x}} = \frac{\sqrt{5-0}}{1+0}$

$= \sqrt{5}$

2.3 #32

$$\lim_{x\to\infty}\left(\sqrt{x^2-3x}-x\right)$$

$$=\lim_{x\to\infty}\frac{\left(\sqrt{x^2-3x}-x\right)}{1}\cdot\left(\frac{\sqrt{x^2-3x}+x}{\sqrt{x^2-3x}+x}\right)$$

$$=\lim_{x\to\infty}\frac{(x^2-3x)-x^2}{\sqrt{x^2-3x}+x}=\lim_{x\to\infty}\frac{-3x}{\sqrt{x^2-3x}+x}$$

$$=\lim_{x\to\infty}\frac{x(-3)}{\sqrt{x^2}\sqrt{1-\frac{3}{x}}+x(1)}$$

$$=\lim_{x\to\infty}\frac{x(-3)}{\underline{x}\left(\sqrt{1-\frac{3}{x}}\right)+\underline{x}(1)}$$

$$=\lim_{x\to\infty}\frac{x(-3)}{x\left[\sqrt{1-\frac{3}{x}}+1\right]}$$

$$=\lim_{x\to\infty}\frac{-3}{\sqrt{1-\frac{3}{x}}+1}=\frac{-3}{\sqrt{1-0}+1}$$

$$=-\frac{3}{2}$$

Side bar

$\infty-\infty$

"indeterminate form"

= IDK

2.3 #32

$$\lim_{x\to\infty}\left(\sqrt{x^2-3x}-x\right)$$

Side bar

$\infty - \infty$

"indeterminate form"

= IDK

$$=\lim_{x\to\infty}\frac{\left(\sqrt{x^2-3x}-x\right)}{1}\cdot\left(\frac{\sqrt{x^2-3x}+x}{\sqrt{x^2-3x}+x}\right)$$

$$=\lim_{x\to\infty}\frac{(x^2-3x)-x^2}{\sqrt{x^2-3x}+x}=\lim_{x\to\infty}\frac{-3x}{\sqrt{x^2-3x}+x}$$

$$=\lim_{x\to\infty}\frac{x(-3)}{\sqrt{x^2}\sqrt{1-\frac{3}{x}}+x(1)}$$

$$=\lim_{x\to\infty}\frac{x(-3)}{-x\left(\sqrt{1-\frac{3}{x}}\right)+x(1)}$$

$$=\lim_{x\to\infty}\frac{x(-3)}{-x\left[\sqrt{1-\frac{3}{x}}-1\right]}$$

$$=\lim_{x\to\infty}\frac{-3}{(-1)\left(\sqrt{1-\frac{3}{x}}-1\right)}$$

$$=\lim_{x\to-\infty}\frac{3}{\sqrt{1-\frac{3}{x}}-1}$$

$$=+\infty$$

2.3
10) $\lim_{x \to -\infty} \sqrt{5-x} = +\infty$

2.2
39 $\lim_{x \to 0} \frac{\sqrt{x+4}-2}{x} \cdot \frac{\sqrt{x+4}+2}{\sqrt{x+4}+2}$

$= \lim_{x \to 0} \frac{(x+4)-(4)}{x(\sqrt{x+4}+2)}$

$= \lim_{x \to 0} \frac{\cancel{x}}{\cancel{x}(\sqrt{x+4}+2)}$

$= \lim_{x \to 0} \frac{1}{\sqrt{x+4}+2} = \frac{1}{2+2}$

$= \frac{1}{4}$

$$\underbrace{e^x(x^2-1)}_{\overline{\;e^x\;}} + \underbrace{e^{x+2}(x+4)}_{\overline{\;e^x\;}}$$

$$e^x\left((x^2-1)+e^2(x+4)\right)$$

$$\frac{e^{x+2}}{e^x} = e^2$$

$\frac{22}{33}$) $f(x)=\begin{cases} x-1, & x\le 3 \\ 3x-7, & x>3 \end{cases}$

a) $\lim_{x\to 3^-} f(x) = \lim_{x\to 3^-} x-1 = 2$

b) $\lim_{x\to 3^+} f(x) = \lim_{x\to 3^+} 3x-7 = 2$

c) $\lim_{x\to 3} f(x) = 2$